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Uncertainty in fertility intentions from a life course perspective: Which life course markers matter?

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Abstract

Objective: The aim of this study is to extend our knowledge about uncertainty in fertility intentions from a life course perspective. We want to find out if life course markers such as economic circumstances, relationship status, family size, and the so-called "biological clock" (getting older) influence uncertainty in fertility intentions. Uncertainty in fertility intentions is the state in which individuals are not sure whether they will have (more) children.

Background: Determining what drives uncertainty in fertility intentions may lead to a better understanding of fertility decision-making and its outcomes.

Method: We use German panel data (German Family Panel, *pairfam*) for three birth cohorts (1971-73, 1981-83, 1991-93), and employ multinomial fixed-effects logit models as well as bivariate analyses based on waves 1 to 11.

Results: Uncertainty in fertility intentions is volatile across an individual's life course, serving as a transitional phase between certainly intending and not intending to have any (more) children. Approaching the end of the reproductive life span (getting older), separating from a partner, having two or more children, and, for men, subjective economic fears increase the odds of being uncertain.

Conclusion: By showing that uncertainty in fertility intentions is a volatile concept and that relevant life course markers shape this volatility, we provide new insights into the process of fertility decision-making.

Key words: fertility intentions, uncertainty, panel data, multinomial fixed-effects regressions, Germany

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1. Introduction

In recent decades, the analysis of fertility desires and intentions has played a crucial role in explaining fertility behavior, especially in the context of low-fertility countries. In these countries, "hypothetical" fertility (i.e., ideal or desired fertility) at the individual and the aggregate level is generally higher than actual fertility (Goldstein, Lutz & Testa 2003). Since fertility intentions are conceptualized as a mediator between fertility desires and behavior (Miller 1994), they are also of special interest to family policy-makers who want to close the gap between the desired number of children and the actual birth rate (Philipov 2009). In our paper, we will focus on the issue of uncertain fertility intentions; i.e., the state in which individuals or couples are not sure whether they will have (more) children. This topic has been largely neglected in the literature on fertility intentions. Determining what drives these uncertainties in fertility intentions leads to a better understanding of fertility decision-making and its outcomes. Insights into what actually constitutes uncertainty in fertility intentions could also help policy-makers design targeted interventions.

Early studies (Morgan 1981, 1982; Schaeffer & Thomson 1992) on this topic argued that uncertainty is a central part of the fertility decision-making process, and provided some evidence that uncertainty in fertility intentions is a determinant of fertility outcomes. Individuals who are uncertain about their intentions will hardly try to conceive a (further) child. A more recent study by Ní Bhrolcháin and Beaujouan (2015) emphasized that uncertainty in fertility intentions is a genuine concept, not a residual category that can be explained by measurement errors or a lack of knowledge on the part of the respondents. In the research on this topic, different concepts of uncertainty have been applied. It is therefore hardly surprising that depending on the definition, the prevalence of uncertainty (i.e., the proportion of individuals with uncertain intentions) has been found to vary between 10% and 40% (Kuhnt & Trappe 2013, 2016; Morgan 1981; Ní Bhrolcháin & Beaujouan 2011; Sobotka, 2009). With a few exceptions (Jones 2017), studies on the prevalence and determinants of uncertainty have been based on cross-sectional data (Ní Bhrolcháin & Beaujouan 2011; Sobotka 2009) and/or have focused on special groups, such as women with higher parities (Ruokolainen & Notkola 2002). Thus, we still lack basic knowledge about the determinants of uncertainty in fertility intentions across the life course.

We aim to analyze the phenomenon of uncertainty in fertility intentions in more detail with this in mind. We use panel data over an observation period of 11 years that follow men and women of three birth cohorts with different numbers of children. Thus, unlike previous studies on this issue, we can track uncertainty in fertility intentions over the life course and test for gender-specific differences. The intention to have children is operationalized by the individual's expected number of (additional) children. Based on previous work, which found that fertility intentions are not stable over the life course (Jones 2017), our central hypothesis is that uncertainty in fertility intentions is induced by major changes in life course markers, such as changes in economic resources or separation from a partner.

Our analysis is based on data from the first 11 waves of the German Family Panel. This survey was launched in 2008 and has since been conducted annually. During the

observation period of 2008 to 2019, the level of fertility (based on the total fertility rate) in Germany was among the lowest in Europe, at between 1.3 and 1.6 children per woman (Destatis 2019a). Most of these births occurred within partnerships (Bastin, Kreyenfeld & Schnor 2013). During this period in Germany, the labor force participation rate of women (71% in 2011) was among the highest in Europe (Destatis 2012), while the proportion of mothers who were working (64% in 2010) was at an intermediate level relative to the rest of Europe (BMFSFJ 2012). The proportion of mothers working part-time in Germany during this period was among the highest in Europe.

2. State of the art: Determinants of uncertainty in fertility intentions

In the following, we discuss the main determinants of uncertainty mentioned in the literature regarding life course markers (age, partnership status, number of children, and economic resources). For reasons of comparability, we restrict the following literature review to developed countries.

An individual's *age* is of special relevance to the level of uncertainty. This makes sense from a life course perspective, especially given the limits of the reproductive life span. The empirical results on the role of age in uncertainty have been mixed. Several studies have found that uncertainty in fertility intentions decreases with age (Bernardi, Mynarska & Rossier 2015; Ní Bhrolcháin & Beaujouan 2011; Sobotka 2009), while others have shown that people who are young or middle-aged are often uncertain in their fertility intentions (Berrington 2004; Miettinen & Paajanen 2005; Morgan 1981; Ní Bhrolcháin & Beaujouan 2015). Jones (2017) found that women in their thirties are more likely than younger women to be uncertain. Moreover, a study by Ruokolainen and Notkola (2002) on uncertainty about the transition to a third child found that women aged 35-39 are less certain than younger women.

When we look at the evidence on the effects of *partnership status* on fertility intentions, we see that not having a partner appears to increase the level of uncertainty, while having a partner or being married seems to decrease it (Berrington 2004; Ní Bhrolcháin & Beaujouan 2011; Jones 2017). In addition, the *number of children* already born appears to affect uncertainty in fertility intentions. The combination of being childless and not having a partner has been shown to be associated with a higher level of uncertainty in fertility intentions (Ní Bhrolcháin & Beaujouan 2011; Sobotka 2009). A study of Finnish women with two children by Ruokolainen and Notkola (2002) found that for the transition to a third child, cohabiting with a partner increased uncertainty relative to being married while having children from a previous partnership and an unbalanced gender composition of children reduced uncertainty.

Only a few previous studies have analyzed the impact of changes in economic resources on uncertainty in fertility intentions to the best of our knowledge. In a study by Brauner-Otto and Geist (2018), the economic context was shown to influence uncertain fertility intentions, at least among young adults aged 18-27 in the United States. Their findings also indicated that young adults with lower earnings, less education, and more concerns about their job prospects were less certain than their more economically secure

counterparts that they would have children. In addition, Geist and Brauner-Otto (2017) found that in Germany, the labor force status of young adults aged 18-30 had little influence on their level of uncertainty about their long-term fertility intentions. Another study by Ruokolainen and Notkola (2002), which focused exclusively on Finnish women with two children, showed that a woman's employment status between her first and second birth had no significant influence on her level of uncertainty about her third birth intentions. A qualitative study by Bernardi, Mynarska & Rossier (2015) found that the degree of uncertainty was higher among individuals who were in an unsatisfactory financial situation.

Many of the existing studies on the issue of uncertainty focused on women only (Ní Bhrolcháin & Beaujouan 2011, 2015; Ruokolainen & Notkola 2002; Sobotka 2009; Jones 2017). However, the few studies that included men and women indicated that the prevalence of uncertainty differs between the *sex*es. Using British data, Berrington (2004) found that the proportions of individuals who were uncertain were slightly higher among men across age groups than among women. Based on Finnish data, Miettinen and Paajanen (2005) found that men were more uncertain than women only among respondents aged 18-24.

To sum up, the existing studies do not provide us with a complete picture of the determinants of uncertainty. This is mainly because the recent research focused on this issue from a cross-sectional perspective; i.e., the authors analyzed the question of whether levels of uncertainty differ according to social-structural variables at one specific point in time only. The findings of these studies address questions about the variability of fertility intentions *between* people, but not questions of how or why fertility intentions are volatile *within* a person's life course (e.g., separation from a partner or loss of income due to unemployment). To answer these questions, we need to analyze panel data that contain information on fertility intentions before and after a change in a person's socioeconomic resources was observed.

Employing the German Family Panel over an observation period of eleven years, and utilizing advanced panel techniques that allow us to control for time-constant unobserved individual heterogeneity, we analyze the factors associated with uncertainty in fertility intentions. We focus on the effects of age, separation, family size (i.e., the number of biological children), and changes in economic resources (i.e., worried about finding a new job, being unemployed in the past year, and the partner's loss of full-time employment), as these are the major life course markers that have been found in previous cross-sectional research to influence fertility intentions. Our analysis includes both men and women with different parity. Moreover, we will show that the intention to have a child is indeed volatile across the life course and varies between as well as within individuals. Thus, this article's longitudinal perspective is essential for understanding how fertility intentions change over the life course.

3. Theoretical background and research hypotheses

Our theoretical basis for the analysis of (uncertain) fertility intentions is the life course approach (Billari 2009; Elder 1994; Huinink & Kohli 2014). We assume that fertility

decisions are interdependent with other life domains (e.g., partnership and occupation) and are influenced by individuals' past experiences and expectations of how fertility decisions will affect their future opportunities to act. As having children is associated with direct and indirect costs, and parenthood is a long-term binding commitment (O'Rand 2009), most individuals will consider having a (further) child only if certain prerequisites are fulfilled, such as being in a stable partnership and having stable financial or occupational conditions. If people think that they have not met the main prerequisites for parenthood (e.g., if they have no suitable partner or are uncertain about their future financial capacity because of unemployment), and/or if they anticipate that childbearing will have negative effects on other life domains (e.g., occupational achievement), they may be reluctant to start a family, or at least uncertain about having (further) children. Moreover, as fertility decision-making is a sequential process (Udry 1983), and is based on a short-term perspective (Ryder 1976), a change in an individual's life circumstances, such as separating from a partner or becoming unemployed, may lead to a new evaluation of the person's situation, and a revision of his or her fertility intentions (Ní Bhrolcháin & Beaujouan 2015).

3.1 Hypotheses

Following the life course approach, we outline hypotheses with respect to key life course markers known to influence fertility intentions: i.e., age, separation, number of children, and economic resources.

The first factor to be considered is age, mainly because the reproductive phase is limited for both women and men (Nieschlag & te Velde 2010). We expect that younger respondents will be less uncertain about their fertility intentions than their older counterparts will. We base this expectation on the assumption that because becoming a parent is still far in the future for these young people. They will tend to have fewer doubts than older respondents do that they will be able to realize their fertility plans. We further expect that middle-aged individuals (in their twenties and thirties) will be particularly prone to uncertainty because they are currently caught up in the so-called "rush hour" of life, in which several life domains are being established (e.g., employment, partnership), and other life goals (e.g., traveling) may take precedence. As people at these ages tend to see many alternatives to family formation, they may be especially uncertain about the number of children they will realistically have. Finally, we expect that when women and men get older, they will be more certain about their fertility intentions than their younger counterparts will, given that they either have reached their ideal family size or are nearing the end of their reproductive life span, which places natural limits on fertility intentions. We therefore expect to observe that the association between age and uncertainty varies across age categories; i.e., that uncertainty is most strongly associated with being middle-aged, and is less associated with being older or younger (*H1, age*).

Partnership status is of special relevance for forming fertility intentions because having a partner is not just a biological, but also a normative precondition for forming a family. Since most people think that children should be born within a partnership, not having a partner may be considered a major hindrance to having children (Tesching 2012). Thus, our second hypothesis is as follows: Having separated from a partner

increases the likelihood that an individual will have uncertain fertility intentions (*H2, separation*).

In addition, it has been shown that parity and an individual's experiences with his or her own children can influence his or her intentions to have (further) children (e.g., Miller & Pasta 1995), and the degree of uncertainty of his or her fertility intentions (e.g., Morgan, 1981; Ní Bhrolcháin & Beaujouan 2011). Having children is associated with direct and indirect costs. The direct costs are simply the costs of bringing up children (e.g., financing their education). The indirect costs may include the difficulties parents face in combining family and work due to the mounting responsibilities and tasks associated with having an increasing number of children (Geist, Reynolds & Gaytán 2017; Minkus 2018). Awareness of these potential costs may lead to uncertainty in fertility intentions. Given the role existing children play in the evolution of their parents' fertility intentions, and the impact they have on their parents' well-being, we expect to find that each additional child increases the chances that an individual will be uncertain about his or her fertility intentions (*H3, number of children*).

Whether an individual has sufficient economic resources is also highly relevant to the family formation process (Kreyenfeld 2010, 2015; Schmitt 2012). Becoming unemployed reduces an individual's earned income and negatively affects the level of information the person has about his or her (future) monetary resources for parenthood. Thus, it can be assumed that becoming unemployed and being worried about not finding a suitable job in case one loses or has already lost a job increases the likelihood of having uncertain fertility intentions (*H4a, economic resources*). In this context, however, a gender-specific dimension should be considered. In Germany, gender role expectations favor the male breadwinner model (i.e., the male partner is in full-time employment and the female partner is a full-time caregiver) (Trappe, Pollmann-Schult & Schmitt 2015). The male breadwinner model appears to be gradually changing into a modified breadwinner model, in which the woman works part-time while continuing to be the main caregiver (Ciccia & Bleijenbergh 2014; Trappe, Pollmann-Schult & Schmitt 2015; Minkus & Busch-Heizmann 2020; Minkus 2019). Nonetheless, the effect on uncertainty of a partner not being in full-time employment should be greater for females than for males. Since we believe that the male breadwinner model still plays a role in fertility intentions, we expect to find that the respondent's partner leaving or losing full-time employment will affect women's uncertainty, but not men's (*H4b, economic resources and gender*).

4. Data, variables, and methods

This study uses data from the first 11 waves of the German Family Panel, release 11.0 (Brüderl et al. 2020b). Launched in 2008, the German Family Panel provides data on the formation and the development of intimate relationships and families in Germany (Huinink et al. 2011). Data are collected annually from a nationwide random sample since 2008.

4.1 Dependent variable

Our dependent variable is individuals' fertility intentions. More precisely, we focus on individuals' long-term intentions to have children over their life course, rather than on their short-term intentions (e.g., whether they intend to have children in the next two or three years). In the German Family Panel, long-term intentions to have children are measured using separate questions for childless respondents and respondents with children. *Childless respondents* were asked: "When you think realistically about having children, how many biological or adoptive children do you think you will have?" The answer categories were "no children," "one child," "two children," "three children," "four or more children," "I'm not sure," and "I haven't thought about that." With this wording, our dependent variable follows the understanding of intentions based on Miller (2011: 5): "intentions involve a specific decision to pursue an actionable goal, with an associated commitment and, commonly, a plan for implementing the decision."

Respondents with children were asked: "When you think realistically about having additional children, do you think that you will have more biological or adoptive children in addition to your current children or stepchildren?" The answer categories were "yes," "no," "I'm not sure," and "I haven't thought about that." Respondents who replied "yes" were also asked about the number of additional children they intend to have. The answer categories were "one child," "two children," "three children," "four or more children," "I'm not sure," and "I haven't thought about that."

For the analysis, the answer categories of the dependent variable are combined to form three categories: certainly yes, certainly no, and uncertain. The responses indicating that the individual wants to have (further) children are classified as certainly yes, while the responses indicating that the individual does not want to have (further) children are classified as certainly no. The responses of "I'm not sure" are placed in the uncertain category. We decided not to use the answer category "I haven't thought about that" because it is distinct from the category "I'm not sure" (Bernardi, Mynarska & Rossier 2015). The former indicates that the respondent was not yet concerned about the issue of having children, while the latter suggests that the respondent had already dealt with this issue, but had doubts about having (further) children.[1, 2]

1 Technically, we have deleted all waves in which a respondent chose the category "I haven't thought about that." However, as we acknowledge that there may be a smooth transition between the two categories, we also estimated a model in which we summarized the two categories. In terms of the general direction of the coefficients, the results largely resembled the ones in the manuscript (see Table A.3 in the appendix). However, there were a few more significant effects, which might be partly due to larger sample sizes.

2 The wording of one of the variables included in our dependent variable in the first two waves led to over-reporting of the expected number of children in those waves. To account for this problem, we followed the correction proposed by pairfam (Buhr & Huinink 2014). However, in order to check whether implementing the proposed correction comes about with spurious results in our model, based on a flag variable provided by pairfam, we excluded the cases with possible overreporting. Results are depicted in Table A.5 and overall resemble results from the main model (Table 2).

4.2 Independent variables

Based on our hypotheses, we included the following key explanatory variables in the models: age, partnership status, number of children, and economic resources.

To test our hypothesis regarding the influence of the respondent's reproductive phase, we included age in categories (< 22 years, 22-29 years, 30-37 years, > 37 years).

Partnership status was operationalized by the variable "separation": having a partner (= 0) and having no partner (= 1). A partner can be non-cohabiting or cohabiting.

To test the impact of children on fertility intentions, we included in the models the number of biological children in categories (no children, one child, two or more children).

To cover the economic dimension of fertility intentions, we included in the analysis the respondent's employment status. A respondent was considered to be unemployed if he or she had reported experiencing at least one month of unemployment since the last interview. We also included a dummy indicating whether the partner works full time (=1), as well as a subjective measure on how easily the respondent thinks he or she will find a new job in case he or she loses the current job or when being unemployed already (on a scale from 1 "very easy" to 5 "very hard").

In addition, we included several control variables. Since health problems can also influence an individual's intention to have children (Dommermuth, Klobas & Lappegård 2011), we included a dummy which indicates that the respondent rated his or her health in the past four weeks as fair (=0) or poor (=1). Furthermore, we accounted for living in east Germany (=1), as fertility still varies between the formerly separated parts of Germany; and for education in years.[3] We also included yearly dummies to account for the respective panel year.

4.3 Sample

We started with a sample of 83,132 respondent-years. First, we dropped infertile and homosexual respondents, as these groups face special obstacles in realizing their fertility intentions (Kuhnt & Trappe 2016) and thereby lose 8,490 cases. Thereafter we deleted respondents from the "DemoDiff" sample, which caused loss of 6,585 person-years. Due to missing values on the dependent and any of the independent variables, we lost another 7,191 cases. Furthermore, we excluded respondents who participated in the panel only once (6,844 respondents). By definition, we can only observe a change in fertility intentions in relation to life events if those intentions are reported more than once. We lost 26,926 respondents person-years by excluding respondents who have stable fertility intentions. We ended up with a sample of 27,096 person-years.[4,5] The distribution of the independent variables is shown in Table A.1 in the appendix.

3 Please note that in the German Family Panel everyone who is currently enrolled is assigned the value "0" on the variable "education in years".

4 Note that in the bivariate sample we did not restrict the analyses to respondents who had varying fertility intentions. Thus, the bivariate sample is larger than the sample on which the multivariate analysis is based on.

5 Table A.2 illustrates how respondents who change fertility intentions differ from those who do not.

4.4 Methods

First, we present descriptive information on the prevalence of uncertainty across observed waves. We do so mainly in order to examine whether and, if so, to what extent volatility in fertility intentions exists in Germany. We then discuss the descriptive differences in fertility intentions with reference to our key predictors, i.e., partnership status, age, number of children, and unemployment. The descriptive analysis is weighted using longitudinal sample weights provided by the German Family Panel (for details, see the German Family Panel data manual, Brüderl et al. 2020a).

To identify the effect of our independent variables on uncertainty in fertility intentions, we estimate multinomial logit models with fixed effects using the Stata procedure "femlogit" (Pforr 2014). We apply multinomial logit regression because the dependent variable is a categorical variable with three possible outcomes (certainly yes, uncertain, certainly no). We have chosen to use fixed-effects models because they cancel out between variations, i.e., variation between individuals, by solely estimating the coefficients based on the within-person variation

Since this estimator relies on variation within an individual, time-constant variables (e.g., gender or birth cohort) cannot be included in such a model (Brüderl & Ludwig 2015). However, unobserved individual heterogeneity is controlled in this model, since the fixed-effects estimation cancels out those time-constant individual characteristics (Hill et al. 2020). Because the fixed-effects approach only refers to within-person variance, a change in the partnership variable from zero (partner) to one (no partner) can be interpreted as a separation from the partner; a change in employment status from zero to one can be interpreted as having become unemployed; and so on.

In the multinomial logit models, one group or category of the dependent variable has to be defined as a reference or a base category, and the effects in the other groups have to be interpreted in relation to this base category. Therefore, the odds ratios indicate whether a one-unit change in a continuous independent variable (or a change from zero to one in a dichotomous variable) increases or decreases the odds (or chances) of belonging to a category (e.g., uncertain) compared to the odds of belonging to the base category (e.g., certainly yes). As the results of the estimations depend on the respective base category, we estimate models with different base categories. First, we look at the effect of the independent variables on uncertainty in relation to the base category certainly yes (Table 2). Second, we estimate models with certainly no as the base category (Table A.4 in the appendix).

5. Results

Before we present the multinomial logit models' results with fixed effects, we discuss the findings of a bivariate analysis on uncertainty in fertility intentions from a life course perspective.

5.1 Bivariate Analysis

Out of all respondents who were theoretically able to change their fertility intentions during the examined time span (i.e., all respondents who were observed in more than one wave), 51% changed their fertility intentions at least once during the observation span. We further find that among those who changed their fertility intentions, 34% did so only once, while approximately a third changed their intentions twice and around 16% three times. The remaining 20% changed their fertility intentions for up to nine times. These findings hint at general volatility of fertility intentions over the life course.

Next, we check how central the category of being uncertain was for the half of our sample, who changed their fertility intentions. We suspect that if people changed their fertility intentions, most did not directly change from intending to have (more) children to not intending to have (more) children or the other way around. Instead, we assume that these individuals typically experienced a transition state in which they were uncertain, i.e., they were "not sure." We found that out of all the respondents who changed their fertility intentions, about 43% changed their intentions directly from "yes to no" (28%) or "no to yes" (15%). However, a considerably larger part, i.e., about 57%, changed from intending to have (more) children or not intending to have (more) children to uncertainty or vice versa (22% from "yes to uncertain"; 16% from "uncertain to yes"; 8% from "no to uncertain"; and 11% from "uncertain to no"). These results confirm our assumption that fertility intentions are not a stable phenomenon, but rather fluctuate over the life course and that uncertainty serves as an important transition state if respondents changed their fertility intentions.

In the next step, we look at the distribution over the key variables that have been shown to influence uncertainty in fertility intentions. Table 1 indicates that middle-aged respondents (aged 30-37) were the most likely to report being uncertain (11%), while respondents under 22 years were the least likely to report being uncertain (5%). When we look at the effect of partnership status, we find that respondents without a partner were more likely to report being uncertain than respondents with a partner (see Table 1). A similar pattern is observed when we compare respondents who experienced unemployment with those who did not. Furthermore, we can see that the level of uncertainty was highest among respondents with none or one child, while it was lowest among respondents with two or more children.

Table 1: Distribution of fertility intentions

		Certainly yes	Uncertain	Certainly no	Person-years
Gender	Male	61.7%	9.35%	28.9%	27,346
	Female	57.7%	6.6%	35.7%	27,299
Economic resources	No unemployment	59.9%	7.9%	32.3%	49,669
	Unemployment	58.3%	9.2%	32.5%	4,981
Relationship status	Partner	54.4%	6.9%	38.7%	36,527
	No Partner	70.4	10.1%	19.4%	18,123
Age categories	< 22	90.1%	5.1%	4.8%	10,539
	22-29	83.4	7.8	8.8%	17,723
	30-37	49.9%	11.4%	38.7%	13,500
	> 37	12.2%	7.1%	80.7%	12,833
Number of Children	0	81.1%	7.9%	11.0%	34,677
	1	41.6%	10.1%	48.3%	8,108
	>1	9.6%	6.9%	83.5%	11,864

Database: German Family Panel, release 11.0, waves 1-11; without infertile, DemoDiff, and homosexual respondents; Weighted.

5.2 Findings of multinomial fixed-effects logistic regressions

In the following, we present the multinomial logit models' results with fixed effects ("femlogit"). First, we look at the results for all respondents in order to clarify the overall effects of the variables of interest on uncertainty in fertility intentions (Table 2, Full Model). We then seek to identify the gender-specific effects of the independent variables. To do so, we estimate separate models for women and men (Table 2, Model for Women and Men).[6] We present the determinants of uncertainty in relation to the base category certainly yes (Table 2). To find out whether the effects of the independent variables vary when using a different base category, we estimated an additional model with "certainly no" as the base category (see Table A.4 in the appendix).

We start with the findings on the life course marker *age*. The model for all respondents shows that, compared to respondents between 22 and 29 years, people in the younger (<22 years) and older age groups (30-37 years and >37 years) had higher chances to be in the uncertain category than in the certainly yes category (Table 2, Full Model). This is not fully in line with our expectation that the middle-aged have the highest chances of being uncertain about their fertility intentions (*H1*). On the other hand, when we look at the different models for men and women in Table 2, we can see that middle-aged women (aged 30-37) are significantly more likely to be uncertain than men, for whom we did not find a significant effect. This is partly in line with *H1*. When the reference is changed to the certainly no category (Table A.4), respondents in the oldest age category are not significantly more likely to belong the uncertain than to the certainly no category

Turning again to the model that includes all respondents, we can see that having experienced a *separation* – i.e., a change in the partnership variable from having a partner

6 There has been considerable controversy around the issue of comparing coefficients of logit regressions across models and groups (see Mize 2019). This issue turns out to be even more complex in models using fixed effects. To avoid this debate, we merely look at the significance of men's and women's point estimates.

to having no partner – increased the chances of belonging to the uncertain category relative to belonging to the base category (certainly yes). This is in line with our hypothesis *H2* (see Table 2, Full Model). The results further show that being separated among both women and men increased the odds of belonging to the uncertain category relative to belonging to the certainly yes category (Table 2, Model for Women and Men). Moreover, separation is found to significantly affect the chance of being in the uncertain category for male respondents when the reference is changed to the certainly no category (Table A.4).

The findings on the *number of children* show that, compared to having two or more children, having none or only one child decreased the odds of belonging to the uncertain category relative to the certainly yes category (Table 2, Full Model). This result applied to women and men (Table 2, Model for Women and Men), and is in line with our expectations (*H3*). On the other hand, having none or only one child increased the chances of belonging to the uncertain category relative to the certainly no base category compared to respondents with two or more children (Table A4).

We found mixed evidence that *economic resources* affected uncertainty. While being worried about not finding a suitable job increased the likelihood of being uncertain, having been unemployed in the past years does not (Table 2, Full Model). However, unemployment increases the odds of belonging to the certainly no category relative to certainly yes. Thus, *H4a* can only partly be confirmed. When looking at men and women separately, we find that for men the effect of being worried about finding suitable employment is significant at the 10%-level, while there is no significant effect on women. Although the effect of the variable measuring full-time employment of one's partner is not significant, the differential impact of the belief of finding a suitable job hints at gender-specific effects of economic resources on uncertainty and emphasizes the prominent role the male-breadwinner model still has on forming families in Germany (see also Table A.3). This is in line with *H4b*.

Turning to our control variables, we can see in Table 2 that higher education slightly reduces uncertainty in fertility intentions (Full Model and Model for Women). Moreover, we observe no significant effect of subjective health status on being uncertain. Living in east Germany also has no impact on uncertainty in fertility intentions.

Table 2: Determinants of uncertainty in fertility intentions (odds ratios)

	Full model		Women		Men	
Uncertain						
Age 22-29 years	*Ref.*		*Ref.*		*Ref.*	
< 22 years	1.296*	(0.143)	1.286	(0.215)	1.336+	(0.198)
30-37 years	1.295*	(0.143)	1.391*	(0.220)	1.235	(0.193)
> 37 years	2.732***	(0.550)	3.808***	(1.112)	2.184**	(0.615)
Separation	2.176***	(0.176)	1.965***	(0.241)	2.362***	(0.258)
Two or more children	*Ref.*		*Ref.*		*Ref.*	
No child	0.096***	(0.019)	0.089***	(0.025)	0.113***	(0.033)
One child	0.195***	(0.031)	0.170***	(0.038)	0.235***	(0.055)
Unemployment	1.095	(0.112)	1.246	(0.189)	0.972	(0.134)
Partner not full-time	0.941	(0.076)	0.964	(0.108)	0.887	(0.109)
Not finding a new job easily	1.053*	(0.027)	1.040	(0.039)	1.068+	(0.039)
Years of education	0.976*	(0.010)	0.967*	(0.015)	0.983	(0.014)
Subjective health status	0.972	(0.073)	0.968	(0.098)	0.965	(0.108)
East Germany	0.830	(0.230)	0.685	(0.265)	1.036	(0.417)
Wave dummies	✓		✓		✓	
Certainly no						
Age 22-29 years	*Ref.*		*Ref.*		*Ref.*	
< 22 years	4.511***	(0.581)	5.868***	(1.093)	3.730***	(0.672)
30-37 years	0.887	(0.089)	0.853	(0.122)	0.905	(0.130)
> 37 years	1.969***	(0.330)	2.267***	(0.549)	1.824*	(0.429)
Separation	1.784***	(0.143)	2.072***	(0.246)	1.516***	(0.168)
Two or more children	*Ref.*		*Ref.*		*Ref.*	
No child	0.015***	(0.003)	0.010***	(0.003)	0.020***	(0.005)
One child	0.057***	(0.008)	0.053***	(0.011)	0.063***	(0.013)
Unemployment	1.212*	(0.114)	1.246	(0.168)	1.175	(0.157)
Partner not full-time	0.915	(0.068)	0.946	(0.101)	0.880	(0.097)
Not finding a new job easily	1.051*	(0.025)	1.103**	(0.036)	0.997	(0.034)
Years of education	0.935***	(0.011)	0.916***	(0.014)	0.961*	(0.017)
Subjective health status	1.156*	(0.078)	1.057	(0.096)	1.327**	(0.138)
East Germany	1.056	(0.305)	1.178	(0.461)	0.793	(0.356)
Wave dummies	✓		✓		✓	
Observations (person-years)	27096		13732		13359	
Observations (persons)	3720[1]		1861		1858	
R^2	24,62%		27,86%		22,02%	

Note: Standard errors in parentheses. + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001. Database: German Family Panel, release 11.0, waves 1-11; without infertile, DemoDiff, and homosexual respondents; results of multinomial logit model with fixed effects (femlogit); base category: certainly yes. [1]Note that the Full Model contains one person who neither identifies with being a woman nor with being a man. Thus, person and person-years in men's and women's models do not add up to the Full Model observations.

6. Discussion of our findings and our conclusion

The aim of the present study was to extend our knowledge about the determinants of uncertainty in fertility intentions from a life course perspective. In our study, we employed German panel data (German Family Panel). We found evidence that

uncertainty in fertility intentions is volatile across the life course and depends on critical life course markers. In sum, the results emphasize the crucial role of partnership status and age in fertility decision-making in general, especially in increasing the chances of being uncertain about childbearing intentions.

We found a positive effect of separation from a partner on the chances of being uncertain. This observation is in line with Ní Bhrolcháin and Beaujouan (2011) and Berrington (2004), who showed that this phenomenon can be found not just in Germany but elsewhere in Europe.

Our results further indicated that age played an important role in the likelihood of having uncertain fertility intentions. This observation is in line with the findings of Jones (2017) but is contrary to the results of Miettinen and Paajanen (2005). When women become older, they have higher changes to be uncertain. Similar patterns are found for men. Given that women in Germany have children at higher ages (Destatis 2019b), the women in our sample may continue to be in the age group in which family formation or expansion is still considered possible. However, this finding supports our assumption that women's limited reproductive phase significantly influences their fertility intentions.

Moreover, we found that having two or more children significantly increases uncertainty in fertility intentions, compared to having none or one child. This could be a result of a work-family conflict (Trinitapoli & Yeatman 2018), or it might be attributable to the increased economic pressure parents face with the arrival of each additional child. However, this issue needs to be investigated in more detail in future research.

We found mixed effects of economic resources on uncertainty. While becoming unemployed did not effect uncertainty, the subjective perception of economic resources did matter, at least for men. Our results indicated that men were significantly more likely to be uncertain about their fertility intentions if they expressed a fear of not finding an adequate job if they started looking for one. As no such effect was observed for women, this emphasized the male breadwinner model's lasting importance in German families.

Policy-makers should keep in mind that uncertainty may lead to the postponement of (additional) births. Such delays may result in individuals having fewer births than they had intended, because infecundity increases with age, and/or because social age norms may discourage late parenthood. It should also be noted that uncertainty is a common phenomenon that is experienced by large shares of women and men at different ages across the life course.

While our study contributes to the body of knowledge on the complex process of fertility decision-making from a life course perspective, our findings raise new questions that need to be addressed by further research. First, as some determinants of uncertainty are also relevant for not intending to have (more) children, more research is needed to clarify whether there are life course markers that are uniquely related to uncertainty. Another important issue that should be given more attention is the partner's role in the development of uncertain fertility intentions. Given the basic principle of linked lives inherent in the life course approach and the general importance of applying a dyadic perspective in fertility decision-making, it would be worthwhile in future research to further analyze this issue from a dyadic perspective. Yet another question that may be raised concerns the applicability of our results in an international context. Comparative studies are needed to determine whether our findings can be generalized to other low-

fertility countries. In addition, research that sheds light on the meaning of uncertainty as a concept relevant to the fertility process is worth pursuing. Specifically, future research – possibly using a qualitative approach – should explore the potential differences in the fertility intentions of respondents who say that they "haven't thought about" starting a family, and those who say they are "uncertain" about having children.

Finally, our findings allow us to return to Morgan (1981: 268), who observed that "uncertainty is not 'noise' in the data that should be ignored, discarded, or removed by some post hoc coding procedure. Rather, it is a real phenomenon inherently part of fertility decision making."

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Appendix (Online)

Table A.1: Distribution of variables of interest

	Mean	SD	Min	Max
Certainly yes	0.51	0.50	0	1
Uncertain	0.13	0.34	0	1
Certainly no	0.36	0.48	0	1
Age < 22 years	0.17	0.38	0	1
22-29 years	0.28	0.45	0	1
30-37 years	0.31	0.46	0	1
> 37 years	0.23	0.42	0	1
Separation	0.31	0.46	0	1
No child	0.53	0.50	0	1
One child	0.21	0.41	0	1
Two or more children	0.25	0.43	0	1
Unemployment	0.093	0.29	0	1
Partner not full-time	0.35	0.48	0	1
Not finding a new job easily	3.02	1.24	1	5
Years of education	12.3	4.32	0	20
Subjective health status	0.13	0.33	0	1
East Germany	0.21	0.41	0	1
Observations (person-years)	27096			
Observations (persons)	3720			

Database: German Family Panel, release 11.0, waves 1-11; without infertile, DemoDiff, and homosexual respondents. Not weighted; SD = standard deviation.

Table A.2: Differences between respondents with stable and unstable fertility intentions

	Stable intentions		Unstable intentions		Δ means
	Mean	SD	Mean	SD	
Age < 22 years	0.17	0.38	0.36	0.48	0.20^{***}
22-29 years	0.28	0.45	0.27	0.45	-0.02^{***}
30-37 years	0.31	0.46	0.15	0.36	-0.15^{***}
> 37 years	0.23	0.42	0.22	0.41	-0.03^{***}
Separation	0.31	0.46	0.37	0.48	0.08^{***}
No child	0.53	0.50	0.68	0.46	0.17^{***}
One child	0.21	0.41	0.09	0.29	-0.12^{***}
Two or more children	0.25	0.43	0.23	0.42	-0.05^{***}
Unemployment	0.09	0.29	0.06	0.25	-0.03^{***}
Partner not full-time	0.35	0.48	0.31	0.46	-0.06^{***}
Not finding a new job easily	3.02	1.24	3.02	1.22	0.02^{+}
Years of education	12.3	4.32	10.8	5.29	-1.82^{***}
Subjective health status	0.13	0.33	0.11	0.31	-0.02^{***}
East Germany	0.21	0.41	0.20	0.40	-0.02^{***}
Observations (person-years)	27069		26789		
Observations (persons)	3720		5027		

Database: German Family Panel, release 11.0, waves 1-11; without infertile, DemoDiff, and homosexual respondents. Not weighted; SD = standard deviation. + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001.

Table A.3: Robustness check 1: Determinants of uncertainty in fertility intentions (odds ratios; "have not thought about it" included in uncertainty category)

	Full model		Women		Men	
Uncertain/have not thought about that						
Age 22-29 years	*Ref.*		*Ref.*		*Ref.*	
< 22 years	1.633***	(0.143)	1.537**	(0.211)	1.738***	(0.200)
30-37 years	1.283**	(0.118)	1.352*	(0.189)	1.207	(0.150)
> 37 years	3.456***	(0.586)	4.544***	(1.190)	2.879***	(0.645)
Separation	1.961***	(0.121)	2.059***	(0.201)	1.876***	(0.149)
Two or more children	*Ref.*		*Ref.*		*Ref.*	
No child	0.116***	(0.020)	0.103***	(0.026)	0.147***	(0.035)
One child	0.184***	(0.027)	0.168***	(0.034)	0.218***	(0.045)
Unemployment	1.051	(0.087)	1.216	(0.159)	0.944	(0.102)
Partner not full-time	0.914	(0.062)	0.919	(0.088)	0.879	(0.088)
Not finding a new job easily	1.050*	(0.022)	1.030	(0.032)	1.065*	(0.030)
Years of education	0.971***	(0.007)	0.952***	(0.011)	0.985	(0.010)
Subjective health status	0.932	(0.058)	0.947	(0.083)	0.918	(0.082)
East Germany	0.861	(0.195)	0.836	(0.259)	0.931	(0.311)
Wave dummies	✓		✓		✓	
Certainly no						
Age 22-29 years	*Ref.*		*Ref.*		*Ref.*	
< 22 years	3.956***	(0.490)	5.346***	(0.961)	3.177***	(0.550)
30-37 years	0.953	(0.092)	0.926	(0.128)	0.959	(0.133)
> 37 years	2.258***	(0.368)	2.619***	(0.623)	2.085**	(0.475)
Separation	1.673***	(0.129)	2.037***	(0.234)	1.384**	(0.146)
Two or more children	*Ref.*		*Ref.*		*Ref.*	
No child	0.014***	(0.003)	0.010***	(0.003)	0.018***	(0.005)
One child	0.056***	(0.008)	0.053***	(0.010)	0.061***	(0.012)
Unemployment	1.184+	(0.106)	1.193	(0.155)	1.179	(0.150)
Partner not full-time	0.914	(0.066)	0.949	(0.098)	0.879	(0.094)
Not finding a new job easily	1.053*	(0.024)	1.101**	(0.035)	0.998	(0.033)
Years of education	0.939***	(0.010)	0.917***	(0.014)	0.966*	(0.016)
Subjective health status	1.113	(0.073)	1.018	(0.090)	1.278*	(0.128)
East Germany	0.952	(0.264)	1.116	(0.415)	0.703	(0.309)
Wave dummies	✓		✓		✓	
Observations (person-years)	32193		15736		16452	
Observations (persons)	4539		2110		2248	
R^2	19,80%		23,85%		16,71%	

Note: Standard errors in parentheses. + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001. Database: German Family Panel, release 11.0, waves 1-11; without infertile, DemoDiff, and homosexual respondents; results of multinomial logit model with fixed effects (femlogit); base category: certainly yes.

Table A.4: Determinants of uncertainty in fertility intentions (odds ratios; base category: certainly no)

	Full model		Women		Men	
Certainly yes						
Age 22-29 years	*Ref.*		*Ref.*		*Ref.*	
< 22 years	0.222***	(0.029)	0.170***	(0.032)	0.268***	(0.048)
30-37 years	1.128	(0.113)	1.173	(0.167)	1.105	(0.159)
> 37 years	0.508***	(0.085)	0.441***	(0.107)	0.548*	(0.129)
Separation	0.561***	(0.045)	0.483***	(0.057)	0.660***	(0.073)
Two or more children	*Ref.*		*Ref.*		*Ref.*	
No child	67.842***	(12.746)	96.295***	(27.095)	50.370***	(13.181)
One child	17.696***	(2.507)	18.908***	(3.761)	15.904***	(3.228)
Unemployment	0.825*	(0.078)	0.803	(0.108)	0.851	(0.114)
Partner not full-time	1.093	(0.082)	1.057	(0.113)	1.137	(0.125)
Not finding a new job easily	0.951*	(0.023)	0.907**	(0.030)	1.003	(0.035)
Years of education	1.069***	(0.012)	1.091***	(0.017)	1.041*	(0.018)
Subjective health status	0.865*	(0.059)	0.946	(0.086)	0.753**	(0.078)
East Germany	0.947	(0.274)	0.849	(0.332)	1.261	(0.566)
Wave dummies	✓		✓		✓	
Uncertain						
Age 22-29 years	*Ref.*		*Ref.*		*Ref.*	
< 22 years	0.287***	(0.043)	0.219***	(0.048)	0.358***	(0.075)
30-37 years	1.461**	(0.177)	1.631**	(0.272)	1.364+	(0.243)
> 37 years	1.388	(0.295)	1.680+	(0.497)	1.197	(0.369)
Separation	1.220*	(0.120)	0.949	(0.138)	1.558**	(0.211)
Two or more children	*Ref.*		*Ref.*		*Ref.*	
No child	6.544***	(1.458)	8.535***	(2.774)	5.705***	(1.821)
One child	3.456***	(0.572)	3.222***	(0.722)	3.745***	(0.921)
Unemployment	0.903	(0.102)	1.000	(0.160)	0.827	(0.134)
Partner not full-time	1.029	(0.095)	1.019	(0.129)	1.008	(0.142)
Not finding a new job easily	1.001	(0.029)	0.944	(0.038)	1.072	(0.046)
Years of education	1.044**	(0.015)	1.056**	(0.021)	1.023	(0.022)
Subjective health status	0.841*	(0.070)	0.916	(0.101)	0.727*	(0.093)
East Germany	0.786	(0.270)	0.582	(0.265)	1.306	(0.696)
Wave dummies	✓		✓		✓	
Observations (person-years)	27096		13732		13359	
Observations (persons)	3720		1861		1858	
R^2	24,62%		27,86%		22,02%	

Note: Standard errors in parentheses. + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001. Database: German Family Panel, release 11.0, waves 1-11; without infertile, DemoDiff, and homosexual respondents; results of multinomial logit model with fixed effects (femlogit).

Table A.5: Robustness check 2: Determinants of uncertainty in fertility intentions (odds ratios; inconsistent cases in dependent variable excluded)

	Full model		Women		Men	
Uncertain						
Age 22-29 years	*Ref.*		*Ref.*		*Ref.*	
< 22 years	1.308*	(0.144)	1.299	(0.217)	1.349*	(0.200)
30-37 years	1.263*	(0.140)	1.346+	(0.214)	1.231	(0.194)
> 37 years	2.103***	(0.437)	3.070***	(0.931)	1.636+	(0.475)
Separation	2.078***	(0.168)	1.909***	(0.235)	2.239***	(0.245)
Two or more children	*Ref.*		*Ref.*		*Ref.*	
No child	0.112***	(0.023)	0.103***	(0.029)	0.132***	(0.039)
One child	0.256***	(0.043)	0.233***	(0.054)	0.294***	(0.071)
Unemployment	1.092	(0.113)	1.227	(0.190)	0.976	(0.137)
Partner not full-time	0.943	(0.077)	1.015	(0.115)	0.843	(0.106)
Not finding a new job easily	1.050+	(0.028)	1.037	(0.039)	1.068+	(0.039)
Years of education	0.992	(0.010)	0.988	(0.015)	0.994	(0.014)
Subjective health status	0.952	(0.072)	0.946	(0.098)	0.946	(0.107)
East Germany	0.861	(0.238)	0.734	(0.283)	1.031	(0.412)
Wave dummies	✓		✓		✓	
Certainly no						
Age 22-29 years	*Ref.*		*Ref.*		*Ref.*	
< 22 years	4.606***	(0.597)	6.022***	(1.131)	3.817***	(0.692)
30-37 years	0.869	(0.091)	0.831	(0.124)	0.905	(0.135)
> 37 years	1.795**	(0.329)	2.237**	(0.602)	1.583+	(0.402)
Separation	1.731***	(0.143)	2.108***	(0.261)	1.429**	(0.161)
Two or more children	*Ref.*		*Ref.*		*Ref.*	
No child	0.014***	(0.003)	0.009***	(0.003)	0.021***	(0.006)
One child	0.070***	(0.011)	0.063***	(0.015)	0.080***	(0.018)
Unemployment	1.221*	(0.121)	1.275+	(0.185)	1.161	(0.160)
Partner not full-time	0.928	(0.073)	1.026	(0.116)	0.828	(0.096)
Not finding a new job easily	1.042	(0.026)	1.091*	(0.039)	0.991	(0.036)
Years of education	0.959***	(0.011)	0.946***	(0.015)	0.979	(0.017)
Subjective health status	1.123	(0.080)	1.047	(0.101)	1.253*	(0.136)
East Germany	1.064	(0.310)	1.221	(0.489)	0.773	(0.346)
Wave dummies	✓		✓		✓	
Observations (person-years)	24388		12064		12319	
Observations (persons)	3394		1652		1741	
R^2	20,22%		22,50%		18,73%	

Note: Standard errors in parentheses. + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001. Database: German Family Panel, release 11.0, waves 1-11; without infertile, DemoDiff, and homosexual respondents; results of multinomial logit model with fixed effects (femlogit); base category: certainly yes.

Information in German

Deutscher Titel

Unsicherheit in den Fertilitätsintentionen aus der Perspektive des Lebenslaufs: Welche biografischen Ereignisse sind relevant?

Zusammenfassung

Fragestellung: Ziel dieser Studie ist es, unser Wissen über die Unsicherheit von Fertilitätsabsichten aus der Perspektive des Lebenslaufs zu erweitern. Wir analysieren, ob die Unsicherheit der Fertilitätsabsichten von Lebensverlaufsereignissen wie wirtschaftlichen Umständen, Beziehungsstatus, Familiengröße und der so genannten "biologischen Uhr" (Älterwerden) beeinflusst wird. Unsicherheit in den Fertilitätsabsichten ist der Zustand, in dem Individuen nicht sicher sind, ob sie tatsächlich (weitere) Kinder haben werden.

Hintergrund: Die Bestimmung der Determinanten der Unsicherheit von Fertilitätsabsichten kann zu einem besseren Verständnis von Fertilitätsentscheidungen und damit letztlich auch derer Ergebnisse führen.

Methode: Wir verwenden deutsche Paneldaten für insgesamt drei Geburtskohorten (1971-73, 1981-83, 1991-93) und nutzen multinomiale Fixed-Effect-Logit-Modelle sowie bivariate Analysen auf der Basis der Wellen 1 bis 11 des Beziehungs- und Familienpanels pairfam.

Ergebnisse: Unsicherheit in den Fertilitätsabsichten erweist sich als nicht stabil über den Lebenslauf eines Individuums und dient als Übergangsphase zwischen sicherer und fehlender Intention (weitere) Kinder haben zu wollen. Das Ende der reproduktiven Lebensspanne (Älterwerden), die Trennung von einem Partner und bereits zwei oder mehr Kinder zu haben, erhöhen die Chancen, unsicher hinsichtlich der Fertilitätsintentionen zu sein für Frauen und Männer. Die subjektiv wahrgenommene Veränderung der wirtschaftlichen Lage ist lediglich für Männer relevant.

Schlussfolgerung: Indem wir zeigen, dass Unsicherheit in den Fertilitätsabsichten ein volatiles Konzept ist und dass relevante Marker des Lebenslaufs diese Unbeständigkeit prägen, liefern wir neue Einsichten in den Prozess der Fertilitätsentscheidung.

Schlagwörter: Fertilitätsintentionen, Unsicherheit, Paneldaten, Multinomiale Fixed-Effects-Regressionen, Deutschland

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